

Space Weather Forecast

Issued on Monday, 12 September 2022 at 01:13 Local

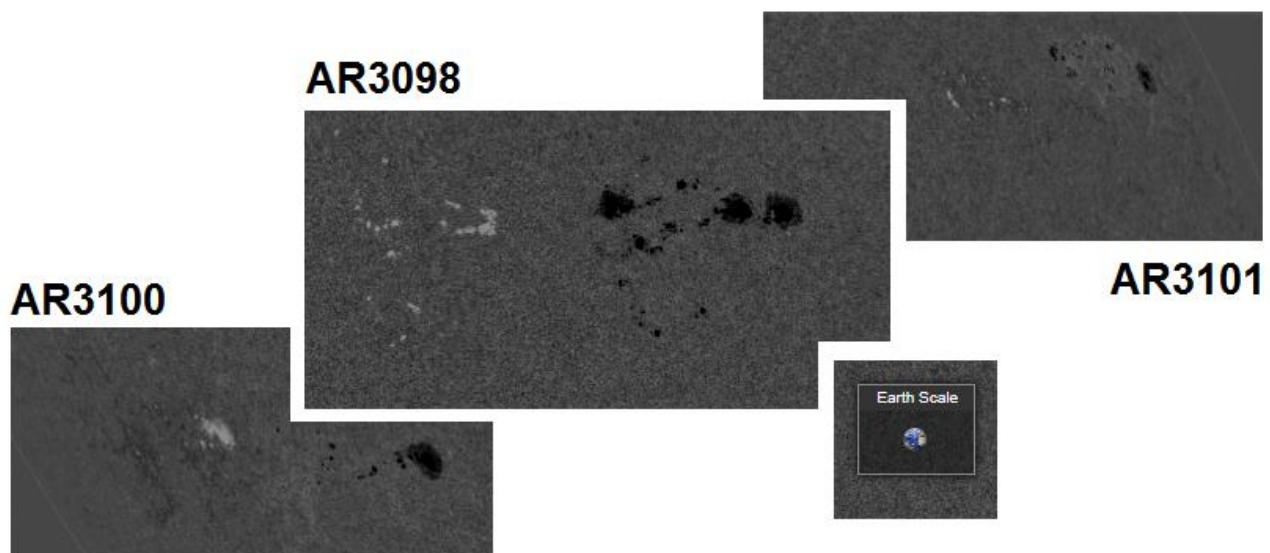
This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Increased Chance of Moderate-class X-ray flares. Possible Minor geomagnetic activity midweek.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity saw a sharp upturn through the UTC day of Sunday 11 September relative to much of the week that preceded it, with this largely tied to the fortunes of a developing sunspot region in the northern central portion of the Sun. X-ray flares rose to frequent mid-level common-class from 09UTC, having previously showed a relatively flat, lower magnitude tendency. The peak flare of the period was a middling common-class observed from the main sunspot group at 11/2228UTC, but with some contribution from a consecutive event on the southeastern solar horizon. The main sunspot showed spreading and areal growth in its intermediate spots in particular.

Figure 3: Helioviewer.org-generated greyscale visible imagery of the largest and most active three sunspot groups on the facing side of the sun. Shown are the sunspot 'footprints' for 10/2345UTC (white) and 11/2245UTC (black). Note especially the marked areal growth and spot proliferation in Active Region 3098 (centre). Earth shown for scale.



There were seven sunspot regions on the Sun in total, with the above by far the largest and most dynamic, but supported in activity to a minor extent by one in the southeast and another in the northwest, which both saw more limited growth. All the other constituent regions were smaller, simpler and either stable or in decay.

Coronal Mass Ejection (CME) activity in the period also increased, with satellite imagery during the
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early hours UTC characterised by a high solar latitude 'prominence eruption' (arc of plasma leaving the Sun), directed both well above the Sun-Earth orbital plane and rearward from the Sun; while a second eruption passed behind the track of the Earth in its orbit later in the UTC morning. During the afternoon, a chain of events saw one of the near 20 degree-spanning central 'filaments' (arcs of plasma) disappear (around 11/1300UTC). This has yet to manifest on satellite imagery but is being monitored.

No new Earth-directed CMEs were in evidence at the time of writing.

Solar Wind / Geomagnetic Activity: The solar wind was at slightly elevated levels, with the decline seen earlier in the weekend halting, perhaps suggesting that there was a transition from the long-lasting stronger fast wind into a smaller and lower magnitude succeeding feature earlier in the UTC weekend.

The solar wind speed was erratic about a roughly level background. The number of particles comprising the solar wind was near its long-term background, while their magnetic field was stable throughout. The north-south component of this field was variable, with a slight bias from co-aligned with Earth's field early in the 24 hours to anti-aligned later on.

The net result of the above solar wind measures was provisionally mainly quiet, below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, with the recent slight enhancement of 10MeV protons stabilising near 1pfu, where 10pfu represents S1.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be higher than of late: low but with a daily chance of moderate-class X-ray flares, with this a result of the growth of the largest and most complex in particular, but also potentially accentuated by two flanking regions, as well as the arrival of a returning sunspot group over the eastern solar horizon.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast carries low confidence. Activity should become increasingly quiet through the first days of the UTC week, with the remaining fast wind soon fading, however interaction between any remnant of a new coronal hole and a possible CME of uncertain origin from 09 September may lead to a slight chance of Minor Storm G1 later on Wednesday 14 into Thursday 15 September.

Despite other recent central 'disappearing filament' CME candidates, they have not appeared in satellite imagery and none yet feature in the forecast.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although the growth of current sunspot regions has led to a slight rise in risk of S1 relative to the recent past.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	1	1	10	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)